What is claimed is:

1. A grain moisture sensor for combines comprising:
a driven plate;
a sense plate proximate to and substantially parallel with the driven plate for capacitive measurement across a spacing between the driven plate and the sense plate; and
a fill plate adjacent the sense plate and substantially parallel with the driven plate for sensing whether the spacing is filled with grain.

2. The grain moisture sensor of claim 1 further comprising a guard at a second spacing proximate to and substantially parallel with the sense plate, the sense plate between the driven plate and the guard.

3. The grain moisture sensor of claim 2 wherein the guard extends beyond a first and a second end of the sense plate.

4. The grain moisture sensor of claim 2 wherein the guard and the sense plate are at the same electric potential.

5. The grain moisture sensor of claim 2 wherein the driven plate is energized to produce electric field lines between the driven plate and the sense plate, the electric field lines substantially parallel to the driven plate and the sense plate.

6. The grain moisture sensor of claim 1 further comprising a temperature sensor operatively connected to the driven plate for sensing a temperature approximating grain temperature.

7. A grain moisture sensor for combines comprising:

a driven plate;

a sense plate proximate to and substantially parallel with the driven plate for measuring capacitance across a grain-filled spacing between the driven plate and the sense plate, the sense plate having a first end and a second end opposite the first end;

a guard proximate to the parallel to the sense plate such that the sense plate is between the driven plate and the guard; and

the guard extending beyond the first end and the second end of the sense plate such that when the driven plate is energized and the guard and the sense plate are at approximately equal potentials, the electric field lines between the driven plate and the sense plate are substantially parallel to the driven plate and the sense plate.

8. The grain moisture sensor of claim 7 further comprising a plurality of selectable signal inputs operatively connected to the driven plate, each signal input operating at a separate frequency.

9. The grain moisture sensor of claim 8 further comprising a plurality of reference admittances operatively connected to the plurality of selectable signal inputs for calibrating the grain moisture sensor.

10. The grain moisture sensor of claim 7 further comprising an electric actuator adapted for filling the spacing between the driven plate and the sense plate with grain when in a first position and adapted for emptying the grain from the spacing between the driven plate and the sense plate when in a second position.

11. The grain moisture sensor of claim 7 further comprising a temperature sensor operatively connected to the driven plate for sensing a temperature approximating grain temperature.

12. A grain moisture sensing system comprising:
a grain moisture sensor having a driven plate and a sense plate proximate to and substantially parallel with the driven plate for capacitive measurement across a spacing between the driven plate and the sense plate;
a grain tank; and
the grain moisture sensor disposed within the grain tank.

13. A method of grain moisture sensing comprising:
selecting a frequency from a plurality of frequencies;
applying the frequency to a parallel plate cell filled with grain;
measuring a first complex admittance of the parallel plate cell filled with grain;
applying the frequency to a reference;
measuring a second complex admittance of the reference; and
computing a complex permittivity from the first complex admittance and the second complex admittance

14. The method of claim 13 wherein the step of computing includes applying a calibration factor to the reference admittance to calculate an empty cell admittance.
15. The method of claim 13 further comprising selecting the second reference admittance from a plurality of reference admittances.
16. A method of measuring moisture of grain comprising:
measuring real and imaginary components of an excitation voltage having a frequency applied to a driven plate of a parallel plate cell;

measuring real and imaginary components of a sense current sensed at a sense plate of the parallel plate cell;
calculating a complex admittance of the parallel plate cell;
calculating a complex admittance of a reference admittance; and
calculating a grain complex permittivity.

17. The method of claim 16 further comprising:
using a plurality of references to determine one or more distortion characteristics of measuring the real and imaginary components.

18. The method of claim 17 further comprising correcting for the determined distortion characteristics.

19. The method of claim 16 wherein the reference admittance is selected from a set comprising the parallel plate cell when empty, a capacitive load, and a complex impedance load.

20. The method of claim 16 further comprising changing the frequency of the excitation voltage.

21. The method of claim 16 further comprising selecting the reference admittance.

22. A grain moisture sensing system comprising:
an excitation signal source for producing an excitation signal;
a sensor cell having a driven plate for applying the excitation signal and a sense plate proximate to and substantially parallel with the driven plate for capacitive measurement across a spacing between the driven plate and the sense plate such that a sense current is produced at the sense plate;

the excitation signal source electrically connected to the driven plate of the sensor cell;

a first synchronous detector adapted for measuring components of the excitation signal, the synchronous detector electrically connected to the excitation source; and

a second synchronous detector adapted for measuring components of the sense current, the synchronous detector operatively connected to the sense plate.

23. The grain moisture system of claim 22 wherein the first synchronous detector is adapted for alternatively measuring imaginary components of the excitation signal and real components of the excitation signal.

24. The grain moisture system of claim 22 wherein the second synchronous detector is adapted for alternatively measuring imaginary components of the sense current and real components of the sense current.

25. The grain moisture system of claim 22 wherein the first synchronous detector is a mixer and the second synchronous detector is a mixer.

26. The grain moisture sensor of claim 22 wherein the excitation signal source is a switch adapted for alternatively selecting one of a first frequency in-phase signal, a first frequency quadrature signal, a second frequency in-phase signal, and a second frequency quadrature signal.